

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Patent Application of:

Shin et al.

Application No.: 10/036,135

Confirmation No.: 3390

Filed: November 07, 2001

Art Unit: 2616

For: METHOD AND SYSTEM FOR PACKET  
ORDERING BASED ON PACKET TYPE

Examiner: Steven Nguyen

**APPELLANT'S AMENDED BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This brief is in furtherance of the Notice of Appeal, filed in this case on November 27, 2007, and in response to the Detailed Action mailed February 4, 2008.

The fees required under 37 C.F.R. § 41.20(b)(2) and any required petition for extension of time for filing this brief and fees therefore were previously submitted on November 27, 2007.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37

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**I. REAL PARTY IN INTEREST**

The real party of interest is Silicon Image, Inc.

**II. RELATED APPEALS AND INTERFERENCES**

The appellant, the appellant's legal representative, and the real party in interest are unaware of any appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal.

**III. STATUS OF CLAIMS**

**A. Total Number of Claims in Application**

There are 35 claims pending in the application.

**B. Current Status of Claims**

1. Claims canceled: 36-43.
2. Claims withdrawn from consideration but not canceled: None.
3. Claims pending: 1-35.
4. Claims allowed: None.
5. Claims rejected: 1-35.

**C. Claims On Appeal**

The claims on appeal are claims 1-35.

**IV. STATUS OF AMENDMENTS**

The appellant has not filed any amendments after the last Office Action of March 27, 2007.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter is directed to a method and device for transmitting packets, such as transmitting data and control packets within a memory. For example, the claimed subject matter recites a method of transmitting control packets and data packets wherein control packets are transmitted ahead of data packets unless a data packet has been delayed more than a certain amount of time.

Independent claim 1:

Independent claim 1 is directed to a method in a communications device for transmitting packets. The method receives packets and stores the packets in memory of the communications device. When the stored packets include a data packet and a control packet, the method determines whether the data packet has been delayed more than a certain amount of time. When the data packet has been delayed more than the certain amount of time, the method selects the data packet. When the data packet has not been delayed more than the certain amount of time, the method selects the control packet. The method then retrieves the selected packet and transmits the retrieved packet.

Support may be found, for example, in paragraphs [00103] and [00104] of the specification.

Independent claim 16:

Independent claim 16 is directed to a method in a communications device for transmitting packets. The method receives packets in an order, the packets being of a first type or a second type. The method transmits the packets in an order different from the order in which the packets were received based on whether the packets are a first packet type or a second packet type unless the transmitting in the different order delays transmitting a packet more than a certain amount of time.

Support may be found, for example, in paragraph [00103] of the specification.

Independent claim 25:

Independent claim 25 is directed to a communications device that includes a memory, a receive component, and a transmit component. The receive component receives data packets and control packets, and stores the received packets in the memory. The receive component stores control packets in a control queue and data packets in a data queue. The transmit component retrieves packets from the memory according to a selection algorithm. The selection algorithm selects a control packet for retrieval over a data packet unless a certain condition is satisfied. The transmit component then transmits the retrieved packets in order of retrieval.

Support may be found, for example, in paragraphs [00103] and [00104] of the specification.

**VI. GROUNDS OF REJECTION TO BE REVIEWED UPON APPEAL**

**A. The Examiner's Rejections**

Claims 16 and 19-23 stand rejected under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 5,757,771 to Li. Claims 1-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the following combination of references:

Claims 1-8, 12, 14-23, 25-30, 32 and 34-35	Burnett (US 5,703,875) and Li
Claim 9	Burnett, Li, and Ellis (US 5,497,371)
Claims 10-11, 31	Burnett, Li, and Cidon (US 5,343,473)
Claims 13, 24, 33	Burnett, Li and Howe (US 2003/0189922)

Claims 17, 18	Li and Official Notice
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## **B. The Issues on Appeal**

Whether Li discloses a system that transmits packets based on the type of packet and/or based on a time delay of transmission of a packet.

Whether the combination of Li and Burnett discloses a system that transmits packets based on the type of packet and/or based on a time delay of transmission of a packet.

## **VII. ARGUMENTS**

### **A. Rejections under 35 U.S.C. § 102(b)**

#### **1. Legal requirements for anticipation**

35 U.S.C. § 102(b) provides:

A person shall be entitled to a patent unless (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

As noted by the Federal Circuit, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

#### **2. The Li Reference**

Li is directed to a queue management system that serves variable bit rate traffic and constant bit rate traffic at different service levels in an ATM switch (Li at Abstract). Li prioritizes data sub-queues, allowing data sub-queues having higher output rankings to send data out before sub-queues having lower output rankings (Li at 5:20-30). Additionally, beginning at column 9, line 14, Li discloses that "a second preferred embodiment of the present invention includes a buffer management system and method

that provides each of the data sub-queues with a minimum bandwidth so that data sub-queues having a low level of priority are not continuously preempted by data sub-queues having higher output priorities."

Li discloses that the output priority and purge priority of a data sub-queue is determined based on whether the sub-queue contains variable bit rate traffic or constant bit rate traffic, and discloses a reason for the priority: "[V]oice traffic generally has a constant bit rate, or CBR, and can tolerate some data losses, but is more sensitive to transmission delay. In contrast, data traffic generally has a variable bit rate, or VBR, and has a low tolerance for data loss, but is less sensitive to transmission delay" (Li at 1:14-26).

3. Claims 16, 19-23: Li does not teach each and every element of the claims

Claims 16 and 19-23 are taken as a group for the purposes of this appeal.<sup>1</sup>

Independent claim 16 recites a method for transmitting packets, comprising:

"receiving packets in an order, each packet being a first packet type or a second packet type; and

transmitting the received packets in an order that is different from the order in which the packets were received based on whether the packets are a first packet type or a second packet type, unless the transmitting of a packet in the different order would delay the transmitting of a packet more than a certain amount of time."

That is, the method includes transmitting packets in an order different than an order of how the packets are received unless transmitting in a different order "would

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<sup>1</sup> The appellant has grouped the claims to simplify issues on appeal. The appellant, however, does not admit that the claims in any group stand or fall together for purposes other than this appeal. In particular, the appellant reserves the right to argue the patentability of each claim separately in a subsequent action, such as reopened prosecution or litigation.

delay the transmitting of a packet more than a certain amount of time" (emphasis added).

As described above, Li is concerned with selecting traffic to be transmitted based on whether the traffic is sensitive to transmission delay (such as variable bit rate traffic) or sensitive to data loss (such as constant bit rate traffic). That is, Li discloses selecting which traffic to transmit based on characteristics of the data stream (constant bit rate versus variable bit rate). Li does not discuss selecting which traffic to transmit based on the type of packet, as is recited in claim 16. The actual packets in the data stream in Li may vary widely. For example, constant bit rate data may be audio or video data, and may contain different types of packets. Nor does Li discuss selecting a transmission order based on the amount of delay of transmitting a packet, as is recited in claim 16. For at least these reasons, Li does not teach each and every element of the claim, and cannot anticipate claim 16.

Thus, independent claim 16 and dependent claims 19-23 are patentable over Li.

**B. Rejections under 35 U.S.C. § 103(a)**

1. Legal requirements for obviousness

35 U.S.C. § 103(a) provides:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 U.S.P.Q. 459 (1966), stated:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be



ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

The recent Supreme Court decision in *KSR Int'l v. Teleflex, Inc.*, 550 U.S. \_\_\_\_ (2007) reaffirmed the holdings of *Graham*, and clarified several aspects of the manner in which obviousness should be determined. *KSR*, p. 11. First, "the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results," but "when the prior art teaches away from combining certain elements, discovery of a successful means of combining them is more likely to be nonobvious." *KSR*, p. 12. Second, "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art," rather, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR*, p. 14-15. The Court recognizes that many significant advances will combine familiar elements: "inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *KSR*, p. 15. Additionally, *KSR* instructs that "one of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims" *KSR*, p. 16.

## 2. The applied references

Burnett discloses an integrated control and data network switch that communicates data messages and control messages. Burnett, however, does not disclose or suggest selecting a data packet for transmission over a control packet. For

example, Burnett explains that "in a real-time embedded processing system, a capability is needed for immediately passing a control message (command or status) across the network, even if some of the links along the message path are currently transmitting data messages" (Burnett at 1:18-23). Burnett provides such a capability, stating "If there are control message words waiting to be transmitted over link, they are given priority over any data message words that are ready for transmission over the same link" (Burnett at 1:44-48, emphasis added). Therefore, in the integrated control and data network of Burnett, control messages are always sent before any waiting data messages.

Further evidence of Burnett's approach to sending control messages may be found in the discussion of structural changes of the network of Burnett when control messages are to be transmitted: "Arrival of a control message at a switch 10 changes the crossbar state for the output port 16 needed by the control message, unless the output port is already in use, transmitting another control message. The newly arrived control message preempts any data message currently using that output port 16...after the control message passes through the core crossbar 15, the crossbar state reverts so that the data message can resume" (Id., 3:8-17). That is, when a control message arrives, the crossbar state of the output port changes to a state that only allows the output of control messages. Only in the absence of any control message does the crossbar state "revert" back to a state that allows the output of data messages.

As described above, Li discloses a buffer management system and method that provides each of the data sub-queues with a minimum bandwidth so that data sub-queues having a low level of priority are not continuously preempted by data sub-queues having higher output priorities. The sub-queues are prioritized based on whether they contain variable bit rate traffic (higher priority due to transmission delay sensitivity) or constant bit rate traffic (lower priority).

3. Claims 1-35: The combination of Burnett and Li does not teach each and every element of the claims

Claims 1-35 are taken as a group for the purposes of this appeal.

Independent claim 1 stands rejected over Li and Burnett. Claim 1 recites, *inter alia*, a method for transmitting packets, comprising:

"determining whether the data packet has been delayed more than a certain amount of time;

when it is determined that the data packet has been delayed more than the certain amount of time, selecting the data packet."

As discussed above, Li does not select a packet for transmission when it is determined that a packet has been delayed more than the certain amount of time. Instead, Li is concerned with transmitting traffic based on whether the traffic is sensitive to transmission delay (such as variable bit rate traffic) or sensitive to data loss (such as constant bit rate traffic). That is, Li discloses selecting which traffic to transmit based on characteristics of the data stream, and not based on the delay of transmission of a packet over a certain amount of time.

Burnett does not discuss selecting a data packet over a control packet because the system of Burnett does not have the capability to do so. As described above, control messages in within the system of Burnett are always sent before any waiting data messages.

Thus, independent claim 1 and any depending claims are patentable because the combination of Burnett and Li does not teach every element of the claim. There is no disclosure in either reference of selecting a packet to be transmitted based on the type of the packet and based on a delay of transmission of a packet. Thus, any combination of the references is also lacking.

Independent claim 16 stands rejected over Li and Burnett. Claim 16 recites similar features to those of claim 1, including, *inter alia*:

"transmitting the received packets in an order that is different from the order in which the packets were received based on whether the packets are a first packet type or a second packet type, unless the transmitting of a packet in the different order would delay the transmitting of a packet more than a certain amount of time."

Independent claim 25 stands rejected over Li and Burnett. Claim 25 recites similar features to those of claim 1, including, *inter alia*:

"a transmit component that retrieves the packets from the memory, wherein the retrieving is associated with a selection algorithm that if each queue contains a packet the selection algorithm selects a control packet for retrieval unless a certain condition is satisfied in which case the selection algorithm selects a data packet for retrieval and that transmits the retrieved packets in order of retrieval."

Because claims 16 and 25 contain similar elements to those of claim 1, the appellant submits that independent claims 16 and 25 and any depending claims are patentable for at least the reasons discussed with respect to claim 1.

4. Claims 1-35: There is no suggestion or motivation to combine reference teachings

Furthermore, there is no teaching or suggestion in the references or the prior art that would motivate one of ordinary skill to combine the Li and Burnett references. The office action, at page 5, asserts that "it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method and system for transmitting a low priority packet before high priority packet if the waiting time of the low priority packet is exceeds [sic] a delay threshold as disclosed by Li into the method and

system of Burnett. The motivation would have been to provide a fairness service by providing a low priority packet with a minimum bandwidth so that the high priority packet is not continuously preempted [sic] the low priority packet." The appellant respectfully disagrees.

Burnett clearly teaches away from such a combination. As described above, Burnett discloses a system that always chooses control messages over data messages. For example, one problem disclosed by Burnett is that "a capability is needed for immediately passing a control message (command or status) across the network even if some of the links along the message path are currently busy transmitting data messages" (Burnett at 1: 20-25). Therefore, one of ordinary skill in the art would not be motivated to combine Burnett with Li because Burnett is concerned with transmitting control messages before data messages, and structurally cannot accommodate prioritizing data messages over control messages.

Additionally, the combination of Burnett and Li addresses neither the problem solved by the claimed subject matter, nor the solution. There is no disclosure in Burnett that delaying data messages could be problematic, and therefore, the system of Burnett always delays data messages for control messages. Li also does not address the problem solved by the claimed subject matter because Li discloses a system that serves both VBR and CBR traffic and prioritizes traffic sensitive to transmission delays. That is, Li also does not recognize any problems with delaying data packets in order to transmit control packets. The combination of Burnett and Li discloses neither the claimed subject matter nor any problems addressed by the claimed subject matter. Thus, according to *KSR*, the claimed subject matter would not be obvious over the combination of Burnett and Li.

Therefore, the appellant contends that there is no suggestion in the cited references, or knowledge in the art, that would motivate one of ordinary skill in the art to

combine Li and Burnett. For at least this reason, the appellant respectfully asserts that claims 1-15, 17, 18 and 24-35 are patentable over the combination of references.

5. Claims 16 and 19-23: The claims are improperly rejected under 35 U.S.C. § 103 as being obvious over Burnett in view of Li

The Examiner asserts that Li anticipates claims 16 and 19-23, and additionally asserts that the combination of Burnett and Li renders the same claims obvious. This is an inconsistent assertion. If Li anticipates a claim, it would teach each and every element of the claim, and there would be no reason to go beyond the teachings of Li for purposes of rejecting the claim. The appellant therefore believes that the obviousness rejection is improper in light of the anticipation rejection. However, in an effort to be responsive to the pending rejections, the appellant has included arguments against the obviousness of claims 16 and 19-23 in the above sections.

VIII. CLAIMS APPENDIX

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

IX. EVIDENCE APPENDIX

The evidence appendix is attached hereto as Appendix B.

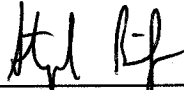
X. RELATED PROCEEDINGS APPENDIX

The related proceedings appendix is attached hereto as Appendix C.

Appellant believes there are no fees due at this time. However, if additional fees are due, please charge our Deposit Account No. 50-0665, under Order No. 594728813US from which the undersigned is authorized to draw.

Dated: March 4, 2008

Respectfully submitted,

By   
\_\_\_\_\_  
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## **APPENDIX A: Claims**

### **Claims Involved in the Appeal of Application Serial No. 10/036,135**

1. A method in a communications device for transmitting packets, the method comprising:

receiving packets;

storing the received packets in memory of the communications device;

when the stored packets include a control packet and a data packet,

determining whether the data packet has been delayed more than a certain amount of time;

when it is determined that the data packet has been delayed more than the certain amount of time, selecting the data packet; and

when it is determined that the data packet has not been delayed more than the certain amount of time, selecting the control packet;

retrieving the selected packet from memory of the communications device; and

transmitting the retrieved packet.

2. The method of claim 1 wherein the memory of the communications device includes a portion for storing data packets and a separate portion for storing control packets.

3. The method of claim 2 wherein each portion of the memory is a FIFO buffer.



4. The method of claim 1 wherein the communications device has multiple ports and the selecting of the packet is performed for packets to be transmitted via the same port.
5. The method of claim 1 wherein the packets with a packet type of control include command packets.
6. The method of claim 1 wherein the packets with a packet type of control include status packets.
7. The method of claim 1 wherein the packets with a packet type of control include message packets.
8. The method of claim 1 including:
  - while transmitting a data packet,
  - receiving a control packet;
  - interrupting the transmission of the data packet;
  - transmitting the control packet; and
  - after the control packet is transmitted, continuing with the interrupted transmission of the data packet.
9. The method of claim 8 wherein each packet has a header and the continuing includes transmitting a header corresponding to the interrupted portion of the data packet.
10. The method of claim 8 wherein each packet has a header and the continuing includes transmitting the remainder of the data packet without transmitting a new header.

11. The method of claim 8 wherein the interrupting of the transmission includes transmitting a preempt primitive and wherein the continuing with the interrupted transmission includes transmitting a continue primitive.

12. The method of claim 1 wherein the communications device is a switch that connects host devices to data store devices.

13. The method of claim 1 wherein the communications device is part of a storage area network.

14. The method of claim 1 wherein the selecting includes selecting control packets before selecting data packets.

15. The method of claim 1 wherein the selecting includes applying a selection algorithm that gives preference to selecting control packets over data packets.

16. A method in a communications device for transmitting packets, the method comprising:

receiving packets in an order, each packet being a first packet type or a second packet type; and

transmitting the received packets in an order that is different from the order in which the packets were received based on whether the packets are a first packet type or a second packet type, unless the transmitting of a packet in the different order would delay the transmitting of a packet more than a certain amount of time.

17. The method of claim 16 wherein the first packet type is a data packet and the second packet type is a control packet and control packets are transmitted before data packets.

18. The method of claim 17 wherein the transmitting includes selecting control packets before selecting data packets.

19. The method of claim 17 wherein the transmitting includes selecting in accordance with a selection algorithm that gives preference to control packets over data packets.

20. The method of claim 16 wherein the communications device has multiple ports and wherein the received packets are transmitted via the same port.

21. The method of claim 20 wherein the packets are received via a single port.

22. The method of claim 20 wherein the packets are received via different ports.

23. The method of claim 16 wherein the communications device is a switch that connects host devices to data storage devices.

24. The method of claim 16 wherein the communications device is part of a storage area network.

25. A communications device comprising:

a memory;

a receive component that receives packets and stores the received packets in the memory, each packet being a control packet or a

data packet, wherein control packets are stored in a control packet queue and data packets are stored in a data packet queue; and

a transmit component that retrieves the packets from the memory, wherein the retrieving is associated with a selection algorithm that if each queue contains a packet the selection algorithm selects a control packet for retrieval unless a certain condition is satisfied in which case the selection algorithm selects a data packet for retrieval and that transmits the retrieved packets in order of retrieval.

26. The communications device of claim 25, wherein the condition is satisfied when the selection of a control packet would delay the transmitting of a data packet more than a certain amount of time.

27. The communications device of claim 26 wherein each portion of the memory is a FIFO buffer.

28. The communications device of claim 25 including multiple ports, each with a transmit component.

29. The communications device of claim 25 wherein the transmit component interrupts transmitting of a data packet to transmit a control packet.

30. The communications device of claim 29 wherein transmitting of the interrupted data packet continues after the control packet is transmitted.

31. The communications device of claim 30 wherein the interrupting of the transmitting includes transmitting a preempt primitive and wherein the continuing with the interrupted data packet includes transmitting a continue primitive.

32. The communications device of claim 25 wherein the communications device is a switch that connects host devices to data store devices.

33. The communications device of claim 25 wherein the communications device is part of a storage area network.

34. The communications device of claim 25 wherein control packets are retrieved before data packets.

35. The communications device of claim 25 wherein packets are retrieved based on a retrieval algorithm that gives preference to retrieving control packets over data packets.

**Appendix B: Evidence**

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

**Appendix C: Related Proceedings**

There are no related proceedings.